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THE
OPHTHALMOSCOPE
IN
GENERAL MEDICINE.

—BY—

WILLIAM OLIVER MOORE, M. D.,

PROFESSOR OF THE DISEASES OF THE EYE AND EAR IN THE NEW YORK
POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL, AND THE MEDI-
CAL DEPARTMENT OF THE UNIVERSITY OF VERMONT, ETC.

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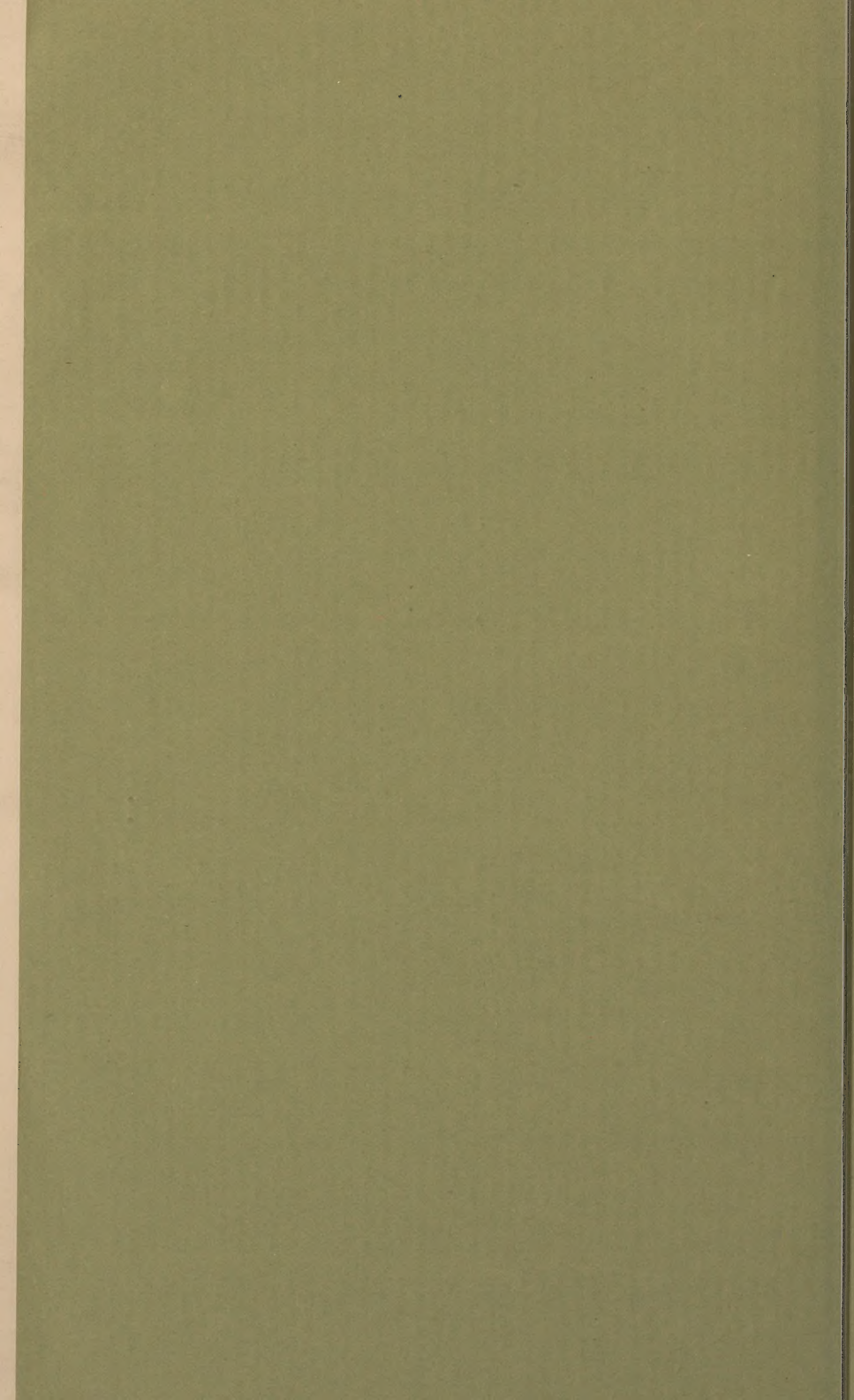
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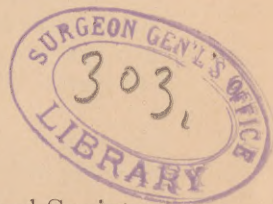
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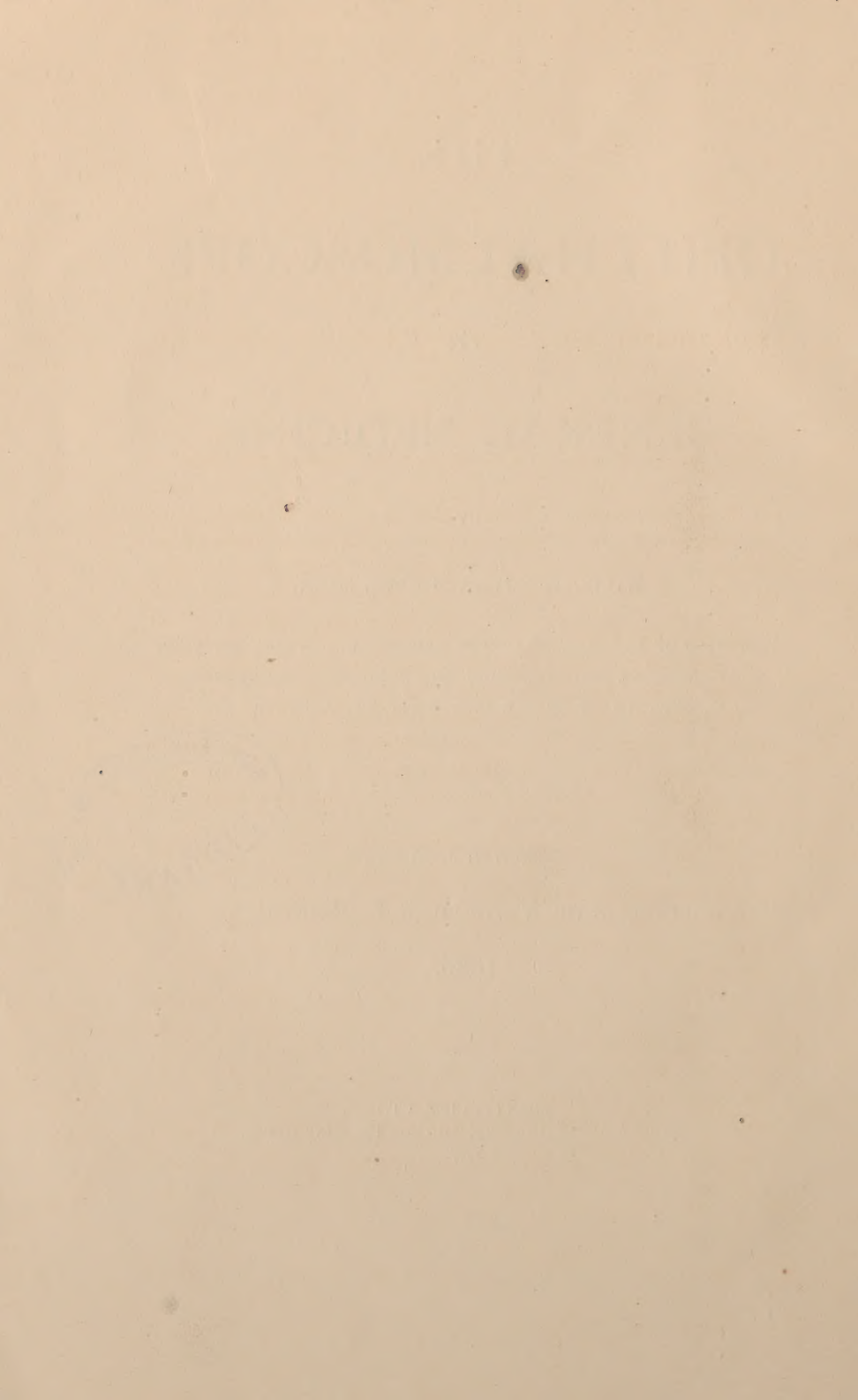
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THE OPHTHALMOSCOPE IN GENERAL MEDICINE.

BY WILLIAM OLIVER MOORE, M. D.,

Professor of the Diseases of the Eye and Ear in the University of Vermont.

“In the whole history of medicine there is no more beautiful episode than the invention of the ophthalmoscope, and physiology has few greater triumphs. With it, it is like walking into Nature’s laboratory and ‘seeing the Infinite in action,’ since by its means we are enabled to look upon the only nerve in the whole body which can ever lie open to our inspection under physiological conditions, and to follow in a transparent membrane an isolated circulation from its entrance into the eye through the arteries to its exit in the veins.”†

By its means we are able to study daily morbid changes in every form and variety, from the slightest congestion to the most flagrant inflammation, and may often through its agency obtain the first warning of disease in some distant organ: as the heart, the kidneys, the spleen, the brain, and the spine.

Thus has the invention of Helmholtz, in 1851, given to us a most powerful aid to diagnosis, and placed the ophthalmoscope as one of the foremost instruments of precision in physical diagnosis.

At the same time it is but just to remember that it is not a cerebroscope in the sense that so many writers on neurology would lead us to believe.

Before describing the changes found in the interior of the eye from general disease, it will be well to consider the usual appearance of the fundus of the normal eye. The most prominent and conspicuous feature of the fundus is the beautiful red background, in the centre of which is the round white optic nerve entrance from the midst of which issue the retinal arteries and veins on their way to supply the delicate tissue of the

† Text-book on Ophthalmoscopy, by Edward G. Loring, M. D. New York, 1885.

retina. The average diameter of the optic nerve is 1.4 mm, and as it is enlarged by the ophthalmoscope in the emmetropic eye $14\frac{1}{8}$ times, it would appear to the eye of the observer as though 20 mm in size. The general appearance of the vessels as they come into retina are a superior and inferior vein. Frequently, however, this arrangement is changed, and a variety of distribution is noticed; a light streak is seen on the arteries and veins running in a longitudinal direction; it is of a pale straw color, and covers nearly one-third of the diameter of the vessel. It is generally more brilliant, broader, more sharply defined, and of a lighter color upon the arteries than the veins.

To the temporal side of the optic nerve entrance may be seen by careful observers the macula lutea, which is situated usually about two diameters of the nerve distant. The background of the normal eye varies in color, according to the pigmentation of the body. If the observed is a blonde, the retinal hue will be more pink; and if a brunette, red or of a darker color; so also does its texture, in some the fundus having a soft appearance like the nap on velvet, and again having a hard, flat look.

This difference in the appearance of the texture of the fundus is probably due to the varying degrees of pigment in the choroid.

The variations in appearance of the fundus of the eye are as unlimited as the number of persons examined. Still, with this variety of color and detail there is a general appearance to the normal fundus which enables the observer, after practice, to distinguish the healthy from the abnormal, whether from congenital or pathological causes.

In the midst of the red field of the interior of the eye appears the optic nerve entrance, or the papilla or disc, as it is termed. Though always circular in form, it is seldom a perfect circle. It is the most conspicuous object in the fundus, and is the part to which both the novice and the adept turn with most frequency, as it is here on the disc that the first signs of intra-ocular change are noticed, whether from diseases of the brain or from the more remote regions of the body.

Its color in health is usually white, or of a slight pink hue. This red or pink hue is more marked toward the nasal side of the disc. The centre often appears more clear than the circumference, owing to the difference in the vascular supply.

The optic nerve entrance is usually on a level with the rest of the fundus, yet it may often appear raised; and this appearance is due to its entering the eyeball on a slant. This difference in the level of the optic

disc, as seen in health and disease, need never be confused, as there are always other diagnostic signs.

The circulation in the retinal vessels is continuous and regular; but any hindrance to the entrance of the current of blood may cause pulsation, first in the veins, and then in the arteries. Such retardation or hindrance may be caused by insufficiency of the aortic valves.

The venous pulse is due to the arrest of the outflow through the veins by the pressure of the arterial current entering the eyeball. The ordinary cause of venous pulse is increased intra-ocular tension, as in glaucoma.

Having thus briefly stated the ordinary appearances of the healthy fundus, let us turn for a few moments and see the great use the ophthalmoscope may become to the physician in his daily practice, for by its means many obscure symptoms may be traced which would otherwise remain unknown; for it is well known that often the interior of the eye is diseased before any failure of vision manifests itself; and if in this early period, when the patient is under the care of the general physician and is in poor health, without definite signs of general disease, the ophthalmoscope being used will show albuminuric retinitis, or perhaps the beginning inflammation of the optic nerve due to tumor of the brain.

Thus in a large number of diseases, intra-ocular changes occur, and may be observed by the ophthalmoscope without difficulty.

The chief changes in the bottom of the eye of interest to the physician are those seen in the retinal vessels, the optic nerve entrance, as congestion, neuritis, or atrophy, and those changes taking place in the retinal tissue. It shall be my effort to only mention some of the more common and usual forms of eye lesion.

BRAIN.

Optic neuritis occurs in about three-quarters of all tumors of the brain.

It usually occurs on both sides alike, and of equal intensity. The vision is very frequently unimpaired at first and may be so throughout. It is in such cases that the ophthalmoscope is of great value in making the correct diagnosis of the general disturbance, as shown by the following case seen by the writer in Charity Hospital:

Patient æt. thirty, with the following history:

Six months before coming under observation had severe pain in the frontal region, although able to attend to his duties. On arriving in

New York, two months later, the headache continued in severity. He had the initial lesion of syphilis two years previous to these eye symptoms; the secondary eruption was well marked.

May, 1873.—Patient very stout and florid; gait unsteady; slowness of speech; no paralysis. Urine normal. No eruptions. Examination of eyes showed pupils dilated $V=\frac{2}{3}$.

The ophthalmoscope showed in the right eye media clear, well-marked papillitis, and great swelling; retinal vessels tortuous and turgid, a few extravasations of blood along their course; neuro-retinitis well marked. Elevation of papilla one-tenth.

Left eye, similar condition of fundus; swelling of disc less marked, being only one-sixteenth; in various places arteries covered by exuded material. Complains still of severe headache.

After being under treatment for two months, the appearances of the eyes changed slightly, the oedema of the papilla diminishing and the nerve taking on an atrophic condition. Vision finally was absolutely lost.

Except for the slowness of speech there was no evidence of any motor disturbance. The patient continued to suffer from the severe headaches, and, becoming comatose suddenly, died in three hours afterward (1873).

The treatment of the case was from the onset by means of iodide of potassium, beginning with twelve grains and increasing to eighty grains three times a day; this latter dose he took for three weeks.

Autopsy Ten hours after death.—Revealed a large syphiloma of the right corpus striatum.

I also well remember another case, showing the value of the ophthalmoscope in the diagnosis of tumor of the brain before loss of vision was manifest, in the person of a boy of seventeen years, who complained of severe headache, and only one other symptom, viz: blepharospasm. Ophthalmoscopic examination, however, revealed the full-marked signs of "choked disc," or Stauung's papille; that is, a swollen nerve, looking angry and as if soaked in glycerine, the outline being dim and indistinct, the blood vessels being tortuous, and the veins very much swollen. The picture of choked disc due to brain tumor, once seen, will never be forgotten.

In this case the vision was absolutely normal in every respect, as the retina in the region of the yellow spot had not become diseased. The

patient died, and at autopsy a cystic tumor was found at the base of the brain impinging on the left optic thalamus.

The size of the brain tumor and the intenseness of the optic neuritis seem to have no relation, as frequently at post-mortem examinations a very small tumor will be found where the intra-ocular symptoms were most marked, and *vice versa*. The rapidity in the growth of the tumor has probably more to do with this than the size; growing slowly, the brain accommodates itself to the foreign body.

Often the tumor and the neuritis correspond in their course, each being acute or chronic; the more usual form is the acute, and if the patient survives long enough the optic nerve undergoes atrophy, more or less complete, owing to the extent of the inflammatory process. Gummy tumors of the brain are frequently cured by treatment, the optic neuritis will subside in consequence; yet the damage done the optic nerve fibers remains, and either complete or partial atrophy results. Thus the great necessity of an early diagnosis, before much damage is done the optic nerve by the inflammatory exudation.

ABSCESS OF THE BRAIN.

Optic neuritis occurs in a considerable number in this affection, and the following case is an example where the ophthalmoscope was confirmatory of the diagnosis of abscess of the brain.

W. P., æt. 50, German, machinist by occupation.

Previous history.—Three years since he had an attack of ear ache, followed by a discharge of pus from the right ear. The acute symptoms rapidly subsided, leaving only a slight discharge, which has continued to the present time.

Present condition. *Sept. 14th*, 1881.—The patient, while bathing, got salt water into the ear, causing great pain at the time, increasing in the following twenty-four hours. When first seen, on *Sept. 15th*, the meatus was filled with pus, the membrani tympani perforated, the tissues over the mastoid much swollen, $R\ H\ D = \frac{0}{48}$. An incision was immediately made over mastoid three-fourths of an inch long and down to the bone, thoroughly dividing the periosteum; no pus escaped. The wound was dressed by carbolized tent.

Sept. 22d.—Patient, lost sight of since last date, returns with increased swelling and pain over mastoid region. The former incision, partly closed, was now enlarged, this time with an escape of pus. A probe can be passed through the carious bone into the mastoid cells.

Sept. 29th.—Wound dressed daily; large amount of pus escaped from it, also from meatus.

Nov. 12th.—Complains of pain in head; pus still escaping; bone spongy.

Nov. 15th.—Hardly able to walk; great pain in head; loss of appetite, nausea and vomiting. Less pus from wound and meatus; temperature 100° F., pulse 78; rational but lethargic.

The pulse varied from 60 to 80, and reached 120 only one hour before his demise.

From Nov. 16th to the 18th he remained in a semi-conscious condition, pus from meatus and wound escaping in small quantity only.

Nov. 19th.—Right side, facial paralysis, and marked divergent strabismus; pupils contracted.

An ophthalmoscopic examination made at this time showed venous engorgement and optic neuritis.

Nov. 20th. Death, after four hours of coma.

The right lobe of the cerebellum contained an abscess as large as a black walnut, situated in the centre of the lobe; the membrane enclosing it was quite thick; the contained pus was quite fetid.

The mastoid cells were free of pus; the tympanic cavity contained a few drops only.

The ear disease was the starting-point, necrosis of the cranial bones followed, then phlebitis of lateral sinus and abscess of the cerebellum, the patient finally succumbing to the acute meningitis.

Anæmia and hyperæmia of the brain do not, as a rule, affect the retinal circulation, this being regulated apparently by the intra-ocular tension. This fact is so well known by the ophthalmoscopist that when he hears of cerebral hyperæmia being diagnosed simply by the ophthalmoscopic appearance of the optic nerve, he is incredulous, for it is only after some time, and the congestion of the brain of some severity, that the retinal vessels become changed. Leucocythæmia often produces serious disturbance in the fundus, due to serous exundation through the vessels.

Cerebral hemorrhage gives very rarely any ophthalmoscopic picture; but, on the contrary, cases of retinal hemorrhage give warning to us of the probably future occurrence of hemorrhages into the brain.

In cerebral disease of children the ophthalmoscope, in a series of observations, showed the following ocular changes: In 63 cases of intracranial disease, a morbid condition of the fundusoculi was seen in 47;

of the 47, 18 were cases of neuro-retinitis, 13 of neuro-retinitis and papillary engorgement, 4 of congestion of the optic nerve, 4 of optic neuritis, 2 of atrophy of the optic nerve (consecutive), and 6 of atrophy. In 10 cases of acute tuberculosis, where at post mortem tubercles were found, 7 out of 10 cases had either retinitis or optic nerve atrophy, Although the writer has made many ophthalmoscopic examinations of acute general tuberculosis, yet he has failed to find one where tubercle in the choroid could be detected.

SPINAL DISEASES.

The most common form of intra-ocular change in diseases of the spinal cord is at first congestion of the optic disc, and, later, the resulting atrophy. If it be the spinal marrow which is diseased by anterior or posterior sclerosis, through the agency of the sympathetic nerve, we get the ocular symptoms showing themselves.

Locomotor ataxy causes atrophy of the optic nerves in about fifteen per cent., and it is more commonly an early rather than a late symptom. It occurs even years before the usual signs of in-co-ordination, and the optic nerve atrophy, with the Argyle Robinson pupil, are frequently the only signs to direct our attention to the spinal cord as a cause. In multiple sclerosis, optic nerve atrophy may occur, but less frequently than the posterior form. Sight usually suffers very much in these forms of atrophy, and the color sense is also destroyed.

In Pott's disease the only ocular symptom seen is a flushing of the optic disc.

IN DISEASES OF THE KIDNEY.

It was in the same year that Helmholtz invented that most exact of all aids to physical diagnosis, the ophthalmoscope, which opened such an era in general as well as ophthalmic medicine that Landowzy made a special study of these affections. Instead of the visual disorders in kidney disease being now looked upon as interesting symptoms in the progress of the disease, they have now become an index of *unsuspected kidney affection* and a means of diagnosis. Frequently patients with failing vision present themselves to our notice, complaining only of this defect, and by the ophthalmoscope we are able to diagnose albuminuria and renal disease, already well established, by the invariable retinal picture; so characteristic is it, that when once seen it cannot be mistaken thereafter.

The changes that take place in the retina in kidney diseases are, more commonly, retinitis albuminurica, amaurosis uræmica, and detachment of the retina.

Retinitis Albuminurica.—It may occur in every form of renal inflammation, and has been seen in the amyloid degeneration, yet is more commonly associated with the granular or contracted kidney. It occurs during pregnancy and after scarlatina, and may be found in cases of spontaneous origin. The frequency with which it is associated with the kidney disease is variously stated—*e. g.*, Galezowski found retinitis albuminurica in 33 per cent., Lebert in 20 per cent., Lecorche in 21 per cent., Earles in 29 per cent., and Ayres in $9\frac{1}{2}$ per cent. Voelckers in thirty cases found two incident to pregnancy, and the rest in the contracted kidney. It would thus seem that about 23 per cent. of patients with renal inflammation have disorders of vision at some period of the disease. In many cases the renal disease is well established before the eye symptoms present themselves, and very often the eye lesion is the first indication of general disease.

Patients with this complication of kidney disease complain only of a gradual failure of sight, everything appearing blurred and smoky. This failure of vision may in some instances come on rapidly. It generally occurs in both eyes simultaneously, although I have seen it in only one eye, the other remaining normal. Such a case has recently been under my care.

In these cases the patient will often complain of some trivial eye symptom, and, the ophthalmoscope not being at hand, the case is dismissed; where, if carefully examined, the diagnosis of renal disease might have been made, and the treatment established long before the general signs manifested themselves.

Ophthalmoscopic Appearances.—It is rarely that we have the opportunity of seeing the first stage of the disease but those who have describe the appearances as those of congestion. Subsequently, when the patient presents himself for treatment, we find cloudiness of the papilla of the optic nerve and the adjacent retina, the nerve looks gray and swollen, its margin is indistinct, the retinal veins are large and tortuous, and show points of different color, as they are deep or more superficially seen. The arteries are smaller or normal in size; the retina about the nerve is cloudy and œdematous, with extravasations of blood here and there present, concealing, in some instances, the vessels. They are sometimes round, and again irregular in shape. We also notice white spots of va-

rious sizes, from a pin's point to the size of the papilla itself. In the macula region we find on its temporal side many fine white dots radiating from it as a centre. These dots look very much as if a brushful of white kalsomine had been thrown over the retina at this point. Often the previous cloudiness of the retina mentioned increases, the exudations grow larger, coalesce, and surround the optic papilla; the hemorrhages may increase, the specks and dots about the macula increase and become confluent. The refraction of the eye in these cases is usually hyperopic, owing to the œdema of the retina. These appearances are usually in both eyes alike, yet they may vary. In some cases they are much less marked, and we have only the peculiar stippling at the macula without any swelling of the optic papilla, and with only few, and perhaps no, hemorrhages.

These changes may subside again, the white patches becoming smaller, and the vessels they covered becoming again visible, the cloudiness of the retina subsiding, and the outline of the optic nerve appearing. Only in that form following scarlatina, and that which accompanies the nephritis of pregnancy, do we see occasionally complete absorption; of course when the optic nerve has had much infiltration in the beginning more or less damage is done to it, and atrophy of its fibers will ensue. These changes, above described, are found in retinitis albuminurica occurring in pregnancy and in the various forms of renal disease.

DIABETES.

We will frequently be led to this diagnosis by the examination of the eye, not by the discovery of cataract that so commonly occurs in the late stages of this disease, but from some slight impairment of vision caused by a retinal hemorrhage due to an extravasation of blood. Such a case was under my care during the past summer, in a lady of forty years of age, who had not had her attention called to any increased flow of urine, and it was only the retinal changes that led her to the true cause.

DISEASES OF THE HEART.

One of the most common affections of the eye due to heart disease is embolism of the central artery of the retina, due to a plugging of its calibre, and is more usually found in the cases of valvular disease of the heart. The retinal arteries are so dwindled as to be scarcely seen, and the retinal veins are dilated; there may be also hemorrhages scat-

tered throughout the fundus, the retina being more or less opaque in appearance.

Hemorrhages without exudation may be frequently seen in the retina as a result of arteritis. These rarely produce extreme impairment of vision. Their chief importance is the warning they give of the condition of the blood vessels in the brain and the rest of the body: and, as previously mentioned, such hemorrhages occurring in the eye are apt to be forerunners of hemorrhages into the brain.

IN ACUTE GENERAL TUBERCULOSIS

tubercles are found at post-mortem frequently in the choroid; yet I have failed, after many careful researches and examinations, to see any by the ophthalmoscope; this good fortune is still reserved for me. The tubercle in the choroid, when seen by the ophthalmoscope, appears like a yellow-white spot free from any pigmentation. These bodies when seen during life give, of course, conclusive evidence of the general disease.

In the acute diseases, as erysipelas, typhus, and typhoid fevers, etc., optic neuritis has been observed, and the following case, occurring in my practice, is an example.

H. C., a male, aged thirty-nine, had received a slight cut, while being shaved, on the right side of the face, near the ear. This soon became affected with the ordinary form of acute erysipelas, in three days spreading over the entire face, though most marked upon the right side. The eyelids were moderately swollen, but no protrusion of the eye was noticed. The erysipelas did not yield promptly; ten days after it began, on opening his eyelids, the patient noticed that his vision was impaired, although to outward appearances the eye was normal. On the fourteenth day I saw him, and on ophthalmoscopic examination found much the same appearances in the fundus as had been seen in Coggin's and Knapp's cases, viz: *Right eye*.—The media were clear, and the optic disc was clear in outline, but its substance was milky, as was the retina near the nerve. The vessels were distorted and tortuous, and there was one small hemorrhage in the retina toward the periphery of the fundus. The arteries were smaller than normal, and carried less blood. Vision was $\frac{1}{200}$. One week later the eyelids were well open, the eye was clear and bright, the pupil moderately dilated, vision the same as before, the optic nerve whiter, the retina less milky, the vessels smaller,

looking as if no blood entered them, and the effused blood was undergoing absorption, one of the vessels looking like a white cord. In two months the patient was totally blind in the right eye, the other remaining in good condition. The only change in the appearance of the fundus was in the optic nerve, which was white and atrophic, with only a few vessels containing blood.

The second picture we see is that of the last stage of the disease, where the patient comes, months after the erysipelas, with the ordinary picture of white atrophy of the optic nerve. In looking over records of cases of atrophy where a probable cause was given, I find out of two hundred cases only one upon which erysipelas was supposed to have a bearing. This percentage is too high.

Thus we see, gentlemen, the great variety and forms of intra-ocular disturbances liable to occur from general disease, and how urgent indeed the necessity of each one of you, and especially the general physician, of acquiring the use of the ophthalmoscope, and making it a part of your daily practice.

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